**Data Analytics on Indian Airflights**

Dataset chosen: DGCA\_FLIGHT\_TRAFFIC

The analysis of this aviation dataset provides valuable insights into airline performance, operational efficiency, and industry trends. By examining various key metrics such as departures, available seat kilometers (ASK), passenger demand, load factors, cargo transport trends, and ton kilometers, we can better understand airline operations and their impact on profitability and efficiency.

Here's an outline of what this dataset typically encompasses:

* Month: The reporting period (e.g., January, February, etc.).
* No. Departure (AF): Number of departures (flights) for aircraft.
* Hours (AF): Total hours flown by aircraft.
* Kms (Thousands) (AF): Distance flown by aircraft in thousands of kilometers.
* No Carried (P): Number of passengers carried.
* Km Performed (Millions) (P): Passenger kilometers performed in millions.
* Avail Seats Km (Millions): Available seat kilometers in millions, representing airline capacity.
* PAX Load %: Passenger load factor as a percentage, indicating seat occupancy.
* Freight CC: Freight cargo capacity.
* Mail CC: Mail cargo capacity.
* Total CC: Total cargo capacity (freight + mail).
* PAX TON KMS Performed: Passenger ton kilometers performed.
* Freight TON KM Performed: Freight ton kilometers performed.
* Mail TON KMS Performed: Mail ton kilometers performed.
* Total TON KMS Performed: Total ton kilometers performed (passenger + freight + mail).
* Avail TONNE KMS (Millions): Available ton kilometers in millions, indicating overall cargo capacity.
* Weight Load Factor %: Percentage of total weight capacity utilized.

**Analytics:**

**1. How has the number of departures (flights) changed over time?**

**Plot Used:** Line Plot (Number of departures over time)

**Key Observations:**

* **Gradual Increase (2010-2015):** The number of departures increased gradually from 2010 to around 2015.
* **Significant Increase (2016):** There was a noticeable spike in the number of departures around 2016.
* **Stability (2017-2019):** The number of departures remained relatively stable during this period.
* **Sharp Decline (2020):** There was a sharp decline in the number of departures around 2020, likely due to the impact of the COVID-19 pandemic.
* **Rapid Recovery (2021-2022):** After the decline, the number of departures showed a rapid recovery and continued to increase, reaching new highs by 2022.

**Interpretation:**

* Gradual Increase**:** Indicates steady growth in the aviation sector.
* Significant Increase: Reflects expansion and increased demand in 2016.
* Stability: Shows a period of consistent air travel activity.
* Sharp Decline**:** Highlights the severe impact of the COVID-19 pandemic on air travel
* Rapid Recovery: Demonstrates the resilience and expansion of the aviation industry in India.

**Conclusion:** The overall trend indicates a strong recovery and growth in flight departures post-pandemic, with the number of departures reaching new highs by 2022. This demonstrates the aviation industry's ability to bounce back and adapt to changing circumstances.

**2. Passenger Load Factor vs Available Seat Kilometres (ASK)**

**Plot Used:** Scatter Plot with Regression Line (Passenger Load Factor vs Available Seat Kilometres)

**Key Observations:**

* **X-axis:** Available Seat Kilometres (Millions)
* **Y-axis:** Passenger Load Factor (%)
* The scatter plot shows individual data points (blue dots) and a linear regression trend (red line with a shaded confidence interval).
* There is a positive correlation between Available Seat Kilometres and Passenger Load Factor, suggesting that as the number of available seat kilometres increases, the passenger load factor also tends to increase.

**Interpretation:**

* The positive correlation indicates that higher seating capacity tends to be associated with higher seat occupancy.
* This trend suggests that airlines are efficiently utilizing available capacity as it increases.

**Conclusion:** The graph shows a positive relationship between Available Seat Kilometres and Passenger Load Factor, indicating efficient utilization of increased seating capacity by airlines. As the number of available seat kilometres increases, the passenger load factor also tends to rise, reflecting effective demand management and capacity planning by airlines.

**3. How has the Weight Load Factor (%) changed over time?**

**Plot Used:** Line Plot (Weight Load Factor (%) over time)

**Key Observations:**

* **X-axis:** Years (from 2008 to 2022)
* **Y-axis:** Weight Load Factor (%)
* The graph shows fluctuations in the weight load factor percentage over time.

There are notable drops around 2020, likely due to the impact of the COVID-19 pandemic, followed by subsequent recovery.

**Interpretation:**

* The fluctuations indicate variations in the utilization of weight capacity over time.
* The significant drop around 2020 highlights the impact of the COVID-19 pandemic on weight load factor.
* The recovery in subsequent years demonstrates the resilience of the aviation industry in adapting to changing conditions.

**Conclusion:** The weight load factor (%) has experienced fluctuations over time, with a significant drop around 2020 due to the COVID-19 pandemic and subsequent recovery. This highlights the aviation industry's ability to adapt and recover from challenging circumstances.

**The flight\_individual.py file contains the code for my individual portion of the flight\_group.py data analysis script.**